

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 14 OCT 2005

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Applicant's or agent's file reference 2004280C4088	<b>FOR FURTHER ACTION</b> See Form PCT/PEA/416	
International application No. PCT/JP2004/016072	International filing date (day/month/year) 22.10.2004	Priority date (day/month/year) 18.11.2003
International Patent Classification (IPC) or national classification and IPC G06F9/46		
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
  - a. ☐ sent to the applicant and to the International Bureau a total of sheets, as follows:
    - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
    - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
  - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand  31.05.2005	Date of completion of this report  13.10.2005
Name and mailing address of the International preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Kalejs, E  Telephone No. +49 89 2399-6919 

**INTERNATIONAL PRELIMINARY REPORT  
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PCT/JP2004/016072

**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-21 as originally filed

**Claims, Numbers**

1-4 as originally filed

**Drawings, Sheets**

1/4-4/4 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-4
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-4
Industrial applicability (IA)	Yes: Claims	1-4
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

**Re Item V.**

**1. The following documents are referred to in this communication:**

- D1: AUDSLEY N C ET AL: "hard real-time scheduling: the Deadline-Monotonic approach" PROCEEDINGS OF THE IFAC/IFIC WORKSHOP, REAL TIME PROGRAMMING, OXFORD, GB, 23 June 1992 (1992-06-23), pages 55-60, XP002243648
- D2: CHIA SHEN ET AL: "RESOURCE RECLAIMING IN MULTIPROCESSOR REAL-TIME SYSTEMS" IEEE TRANSACTIONS ON PARALLEL AND DISTRIBUTED SYSTEMS, IEEE INC, NEW YORK, US, vol. 4, no. 4, 1 April 1993 (1993-04-01), pages 382-397, XP000381810 ISSN: 1045-9219
- D3: LEUNG J Y-T ET AL: "ON THE COMPLEXITY OF FIXED-PRIORITY SCHEDULING OF PERIODIC, REAL-TIME TASKS" PERFORMANCE EVALUATION, AMSTERDAM, NL, vol. 2, no. 4, December 1982 (1982-12), pages 237-250, XP008017817 ISSN: 0166-5316

**2. Lack of inventive step, Article 33(3) PCT**

**2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.**

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document):

A task management system comprising:

- a judgement unit judging whether or not an execution of a task requiring access to a specified resource can be completed before deadline of said task, even if the execution start time for said task is delayed (page 56, column 1, last paragraph. D1 teaches that a task is judged schedulable, i.e it can be completed before its deadline if it doesn't miss its deadline even when all higher priority tasks execute simultaneously);

The subject-matter of claim 1 therefore differs from this known system of D1 in that the system of claim 1 further comprises:

- (a) a registration unit registering said task if the execution thereof can be completed before deadline;
- (b) a control unit halting a resource assignment to a task trying to access the specified resource until a resource assignment to a task having accessed said resource earlier is completed, when switching over the task.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may therefore be regarded as how to manage tasks utilizing the same resource.

The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

The feature (a) actually represents a task scheduler which is a well-known and indispensable part of any system that performs task scheduling. Therefore said feature cannot contribute to inventive character of the alleged invention.

Regarding feature (b), the subject-matter thereof effectively amounts to not switching over to a task that requires a resource that is already being used by another task. However this principle is well-known and is considered to represent common general knowledge in the field in question. For example, document D2 (table 1; figures 9-11) shows a task scheduling scheme that ensures that task T4 is not executed simultaneously with task T2 because T4 requires an exclusive access to resource R1. While D2 discloses this principle in terms of a two processor system, the same concept applies also to single-processor arrangements, as the technical effect remains the same - tasks are not blocked during execution because of resource contention.

- 2.2 Claim 2 contains all features of claim 1 and will therefore be considered as its dependent claim, see also notes re. Item VIII below.

Dependent claim 2 does not contain any features which, in combination with the

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(SEPARATE SHEET)**

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features of any claim to which it refers, meet the requirements of the PCT in respect of inventive step, the reasons being as follows:

The only feature that claim 2 adds to the features disclosed in claim 1 is "an execution unit preferentially executing a task having a shorter period of deadline time among the tasks registered as the execution target tasks".

However, this feature is well-known. In fact, this is the basic principle of the Deadline Monotonic task scheduling algorithm (see document D3, page 240, column 1, lines 9-15) and therefore cannot contribute to the inventive character of the alleged invention.

- 2.3 Claim 3 discloses the same subject-matter as claim 1, only in terms of a method. Therefore the same objections apply also to claim 3 and its dependent claim 4.

**Re Item VIII.**

**1. Lack of clarity, Article 6 PCT**

- 1.1 Claims 2 and 4 comprise all the features of claims 1 and 3, respectively, and are therefore not appropriately formulated as claims dependent on them (Rule 6.4 PCT).